CLAIMS

We claim:

1. A method for controlling an input impedance of an antenna, comprising the steps of:

coupling RF energy from an input RF transmission line to an antenna radiating element through an aperture defined in a ground plane; and

controlling said input impedance by selectively varying at least one dimension of said aperture in response to a control signal.

2. The method according to claim 1 wherein said step of varying said at least one dimension of said aperture further comprises varying at least one of a volume and a position of a conductive fluid.

3. The method according to claim 1 further comprising the step of varying said at least one dimension to maintain an input impedance in a pre-defined range over a selected range of frequencies.

4. The method according to claim 2 further comprising the step of varying at least one of said position and said volume in response to at least one feedback signal provided by a sensor.

5. The method according to claim 1 further comprising the step of forming said aperture as a slot.

6. The method according to claim 5 wherein said step of varying said at least one dimension comprises varying a length of said slot transverse to a length of said RF transmission line.

7. The method according to claim 1 further comprising the step of selecting said radiating element to be a conductive metal patch.

8. The method according to claim 2 further comprising the step of constraining said conductive fluid in a dielectric cavity structure.

9. The method according to claim 2 wherein said conductive fluid is electrically coupled to said ground plane.

10. An aperture coupled antenna, comprising:

an RF transmission line defining an antenna input;

an antenna radiating element;

an aperture defined in a ground plane through which RF energy from said RF transmission line is coupled to said antenna radiating element;

a conductive fluid; and

a fluid control system for selectively varying at least one of a volume and a position of said conductive fluid, whereby by said conductive fluid can be used to modify at least one dimension of said aperture.

11. The aperture coupled antenna according to claim 10 wherein said fluid control system controls an input impedance of said antenna.

12. The aperture coupled antenna according to claim 10 wherein said fluid control system further comprises a controller for automatically varying at least one of said volume and said position in response to a control signal.

13. The aperture coupled antenna according to claim 10 wherein said fluid control system is comprised of a controller and at least one of a valve, a pump, and a fluid reservoir.

14. The aperture coupled antenna according to claim 11 wherein said controller varies at least one of said volume and said position to maintain said input impedance in a pre-defined range over a selected range of frequencies.

15. The aperture coupled antenna according to claim 10 wherein said conductive fluid is comprised of gallium and indium alloyed with a material selected from the group consisting of tin, copper, zinc and bismuth..

16. The aperture coupled antenna according to claim 10 wherein said control system is comprised of a controller and at least one sensor, and said controller varies at least

one of said position and said volume in response to at least one feedback signal provided by said sensor.

17. The aperture coupled antenna according to claim 10 wherein said aperture is a slot.

18. The aperture coupled antenna according to claim 10 wherein said radiating element is a conductive metal patch.

19. The aperture coupled antenna according to claim 10 wherein said conductive fluid is constrained in a dielectric cavity structure.

20. The aperture coupled antenna according to claim 18 wherein said dielectric cavity structure is comprised of a low temperature cofired ceramic substrate.

21. The aperture coupled antenna according to claim 10 wherein said conductive fluid is electrically coupled to said ground plane.

22. A method for controlling an input impedance of an antenna, comprising the steps of:

configuring an aperture coupled antenna to have a first input impedance at a first operating frequency;

selectively varying at least one of volume and a position of a conductive fluid disposed in a predetermined region of said aperture coupled antenna between an input RF transmission line and an antenna radiating element to cause a second input impedance at a second operating frequency different from said first operating frequency to be approximately equal to said first input impedance.